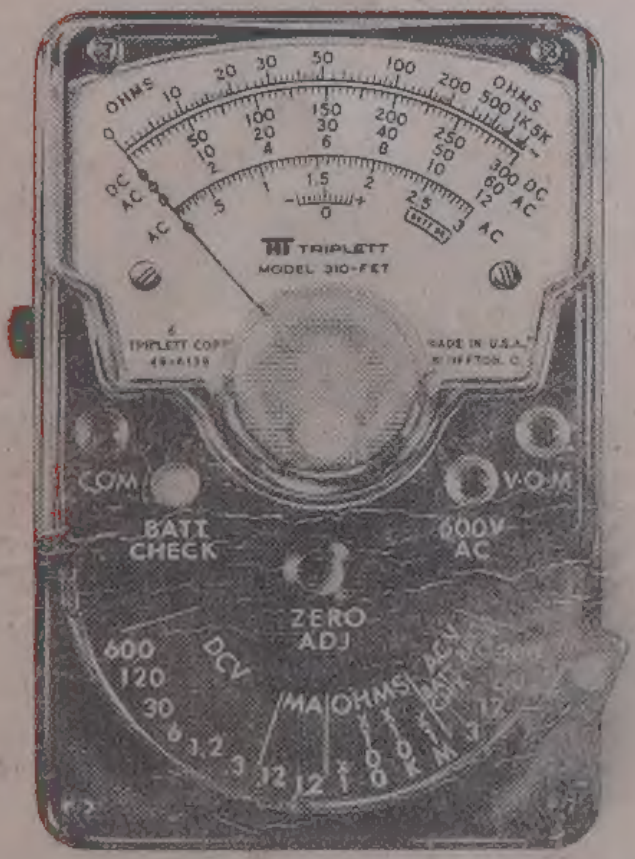


MODEL 310-FET TYPE 1
HAND-SIZE VOM

TRIPLETT

INSTRUCTION MANUAL

WARNING

DO NOT USE THE HIGH VOLTAGE RANGES ON THIS TESTER FOR MAKING MEASUREMENTS ON HIGH POWER OR HIGH ENERGY CIRCUITS SUCH AS FEEDERS, SERVICES, BUSWAYS, OR OTHER POWER DISTRIBUTION CIRCUITS. THIS TESTER IS NOT TO BE USED IN HAZARDOUS LOCATIONS.

WARNING

Electrical circuits can be dangerous and/or lethal when carelessness or poor safety practices occur. Every effort has been made to design this test equipment to prevent accidental shock, but no instrument can be completely safe when used incorrectly.

READ THE MANUAL

Voltages and currents within the capabilities of this test equipment can be hazardous. Follow the instructions in this manual for every measurement. Read and understand the general instructions before attempting to use this tester.

SAFETY CHECK

Double check the switch setting and lead connections before making measurements. Are you following all of the instructions?

Disconnect the tester or turn off the power before changing switch positions.

DON'T TOUCH

Don't touch exposed wiring, connections or other "live" parts of an electrical circuit. If in doubt, check the circuit first for voltage before touching it.

Turn off the power to a circuit before clipping test probes to it. Be sure there is no voltage present before you touch the circuit.

HIGH VOLTAGE IS DANGEROUS

Always start with the power off. Be sure there is no voltage present before making connections to the circuit.

Don't touch the tester, its test leads, or

any part of the circuit while it is on.

Before disconnecting the tester, turn the circuit off and wait for the meter to return to "zero."

DISTRIBUTION CIRCUITS PACK A PUNCH

In high energy circuits such as distribution transformers and bus bars, dangerous arcs of explosive nature can occur if the circuit is shorted. If the tester is connected across a high energy circuit when set to a low resistance range, a current range, or any other low impedance range, an explosive short can result.

Special equipment designed for use with these circuits is available. Contact a qualified person for assistance before attempting to make measurements on any high energy circuit.

SAFETY IS NO ACCIDENT

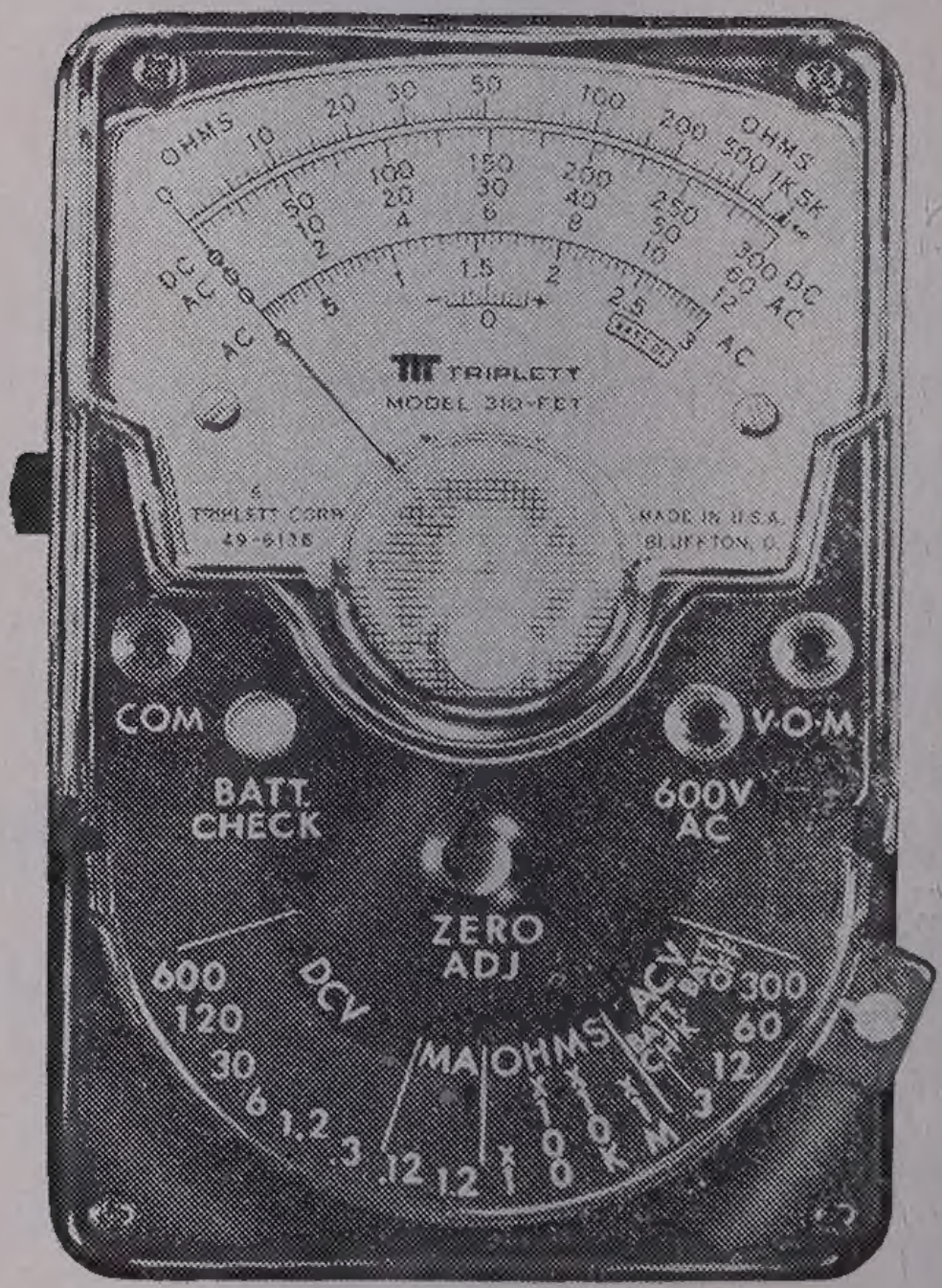
WARNING

REMOVE CLAMP-ON AC AMMETER ADAPTER FROM TESTER WHEN MEASURING VOLTAGE

Table of Contents

	Page
echnical Data	5
eneral Description	6
perating Instructions	
C Voltage Measurements	8
C Voltage Measurements	10
esistance Measurements	12
C Current Measurements	14
peration Chart	16-17
B Measurements	18
laintenance	20
ircuit Diagram	22
arts Location	23
eplaceable Parts	24
ccessories	29
Warranty	30

Solid State VOM



Model 310-FET

Ranges

DC Volts .3, 1.2, 6, 30, 120, 600
Input resistance 10 Meg. constant all DC ranges

AC Volts 3, 12, 60, 300, 600
Input resistance 5000 ohms per volt

DC Milliamperes .12, 1.2 (300 MV)

DB Measurements .1 to 600 Volts. Refer to page 18.

Resistance Ranges X1, X100, X10K, X1 Meg.
50 ohms center scale

Open CKT Voltage 1.5 Volts all ranges

Max. short CKT Current 30 MA

Max. power across device under test 11 MW

Accuracy

3% on all DC ranges
4% on all AC ranges
3% of DC arc on ohms

Weight

Approximately 14 oz.

Size

2¾" x 4¼" x 1 5/16"

Leads

One set leads (black and red) 42 in. long

Batteries

1½ volt and 7 volt
See maintenance section for types

The new 310-FET is a pocket size FET Transistor-Volt-Ohm-Milliammeter. It features ranges, sensitivity and accuracies comparable to larger bench size VTVM's.

The DC Voltage ranges have a constant input resistance of 10 Megohms. The .3 Volt range is approximately 10 times more sensitive than the conventional bench type VTVM, and is excellent for transistor bias voltage measurements.

The AC Voltage ranges have sensitivities of 5000 ohms per volt. The AC ranges are capable of precise measurements over a wide audio frequency range and are ideal for checking sound levels.

Directly under the ohms adjust control located on the side of the meter case in the upper left hand corner is a polarity reversing switch for the DC voltage, current and resistance measurements. With the switch in the UP position a positive voltage is applied to the VOM terminal during resistance measurements. In the DOWN position a negative potential is applied to the VOM jack. ACV measurements should be made with switch in UP (-|-) position.

NOTES

The tester will automatically be turned on when the range switch lever is set to the DC Volts, Current (MA) or Ohms positions. The tester is turned off by returning the range switch lever to any of the AC Volts positions although only one position (300V) is labeled BATT. OFF.

Zero Adjustment

The tester is turned on by setting the range selector to the DC Volts position.

To zero the pointer, short test leads together and adjust the ZERO ADJ. CONTROL located in the center of the range switch lever for a zero indication on the meter.

The tester is now ready for use on DC Voltage Measurements.

DC Voltage Measurements

Six DC Voltages are available for use: .3, 1.2, 6, 30, 120, 600.

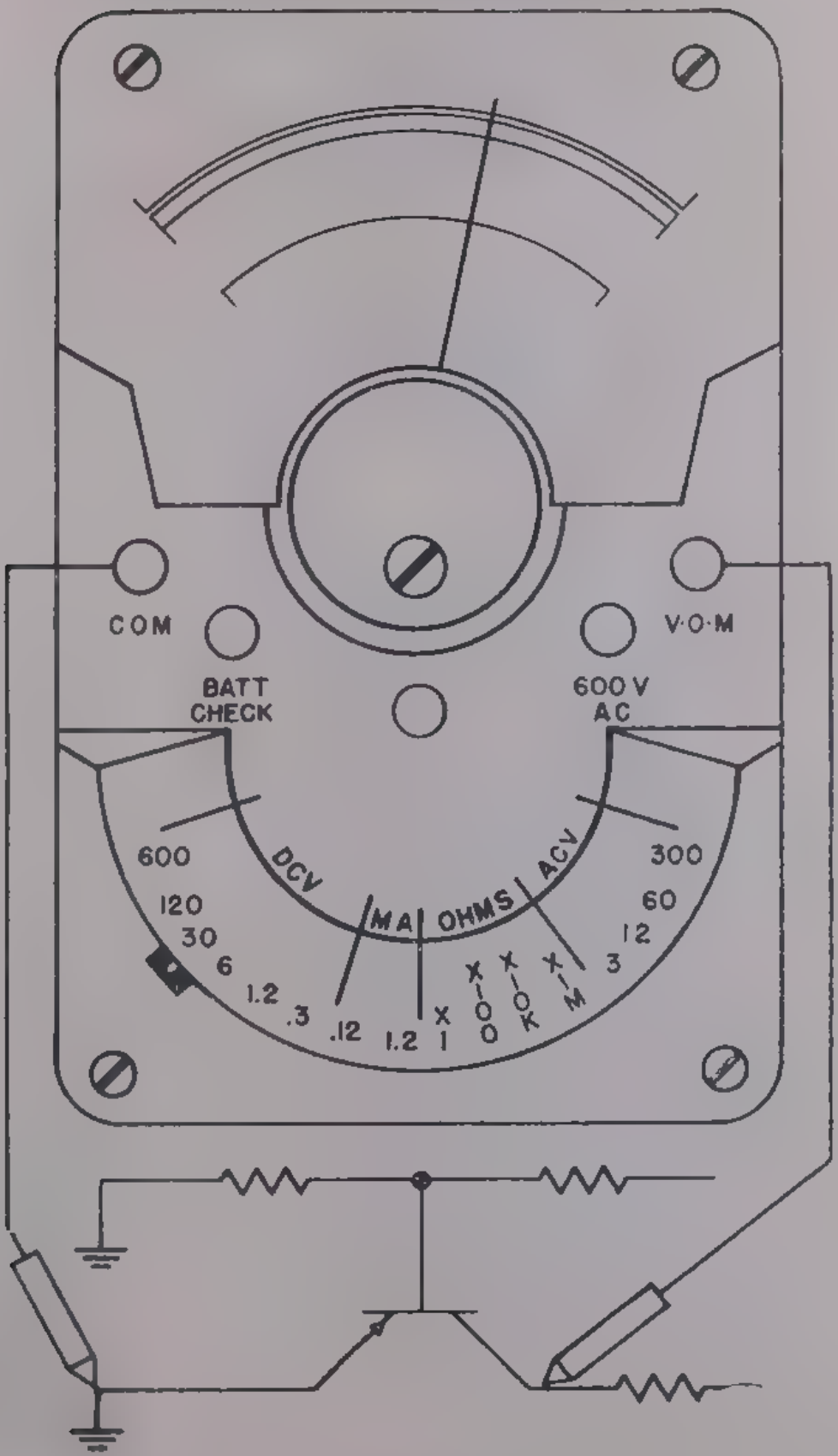
Read all DC Voltages on the black scales and use the appropriate multiplier. For example: the .3 Volts range is read on the 0-300 scale dividing the reading by 1000 or read directly in Millivolts. The 1.2 Volt range is read on the 12 Volt scale dividing the reading by 10. The 6 Volt range is read on the 60 Volt scale with a divide by 10 factor, etc.

Place range switch lever in range position you intend to use. Always start with the highest range if in doubt as to the approximate voltage.

Connect black test lead to "COM" jack and red test lead to "V-O-M" jack.

Isolation resistors for positive probe tip (when desired) may be used with following corrections in reading:

100 K — All DCV 1% low @ full scale
10 Meg. — All DCV 50% low @ full scale


COM
BATT CHECK
V·O·M
600 V AC
600
120
30
6
1.2
.3
.12
DCV
MA
1.2
OHMS
X 1
X—100
X—10K
X—M
ACV
300
60
12
3

AC Voltage Measurements

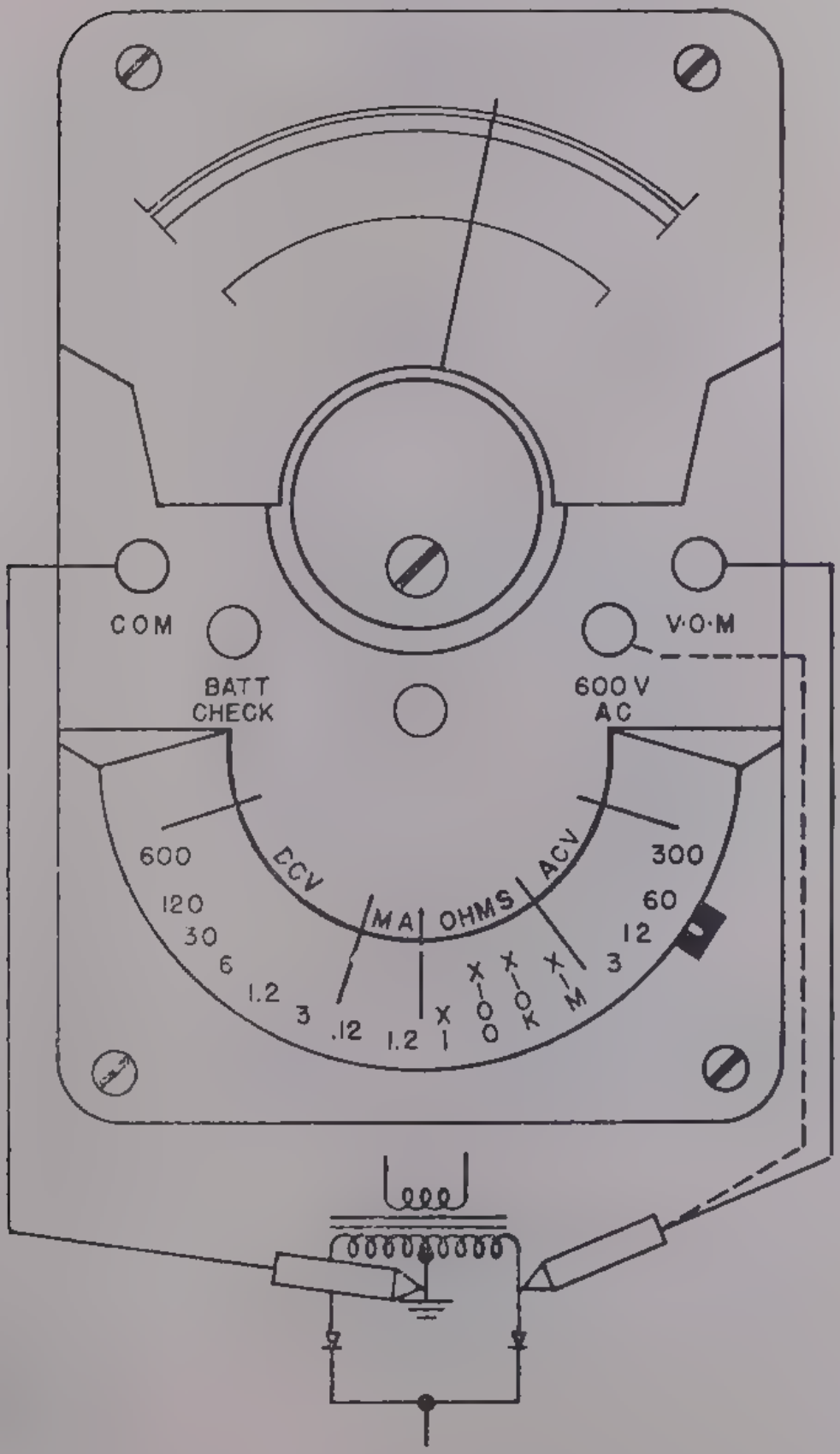
Five AC Volt ranges are available, namely, 0-3, 12, 60, 300 and 600.

For greater accuracy a separate scale is provided for 0-3 Volts. The 0-12, 0-60, and 300 ranges are read direct on corresponding scales. The 0-600 range is read on the 0-60 scale by adding one zero to the reading, i.e., the meter reading 40 would equal 400 volts.

Place range switch lever in range position you intend to use. Always start with the highest range if in doubt as to the approximate voltage.

Connect black test lead to "COM" jack and red test lead to "V-O-M" jack when reading on 0-3, 12, 60 and 300 ranges. To use the 600 AC Volt range connect the red test lead to 600 V AC jack and set switch to 300 ACV position.

Note: When the range selector is in any of the AC Volts positions, the tester batteries are automatically turned off. Therefore the tester can be left in the AC measurement set up position without any drain on its batteries. The operating power is received from the voltage measurement source


COM
BATT CHECK
V·O·M
600 V AC
600
120
30
6
1.2
3
.12
DCV
MA
1.2
OHMS
X 1
X 100
X 10K
X M
ACV
3
12
60
300

Resistance Measurements

Four resistance ranges are available, these are: X1, X100, X10K, X1 Meg. at 50 ohms center scale. This means resistance from 1 ohms to 5000 Megohms can be conveniently measured.

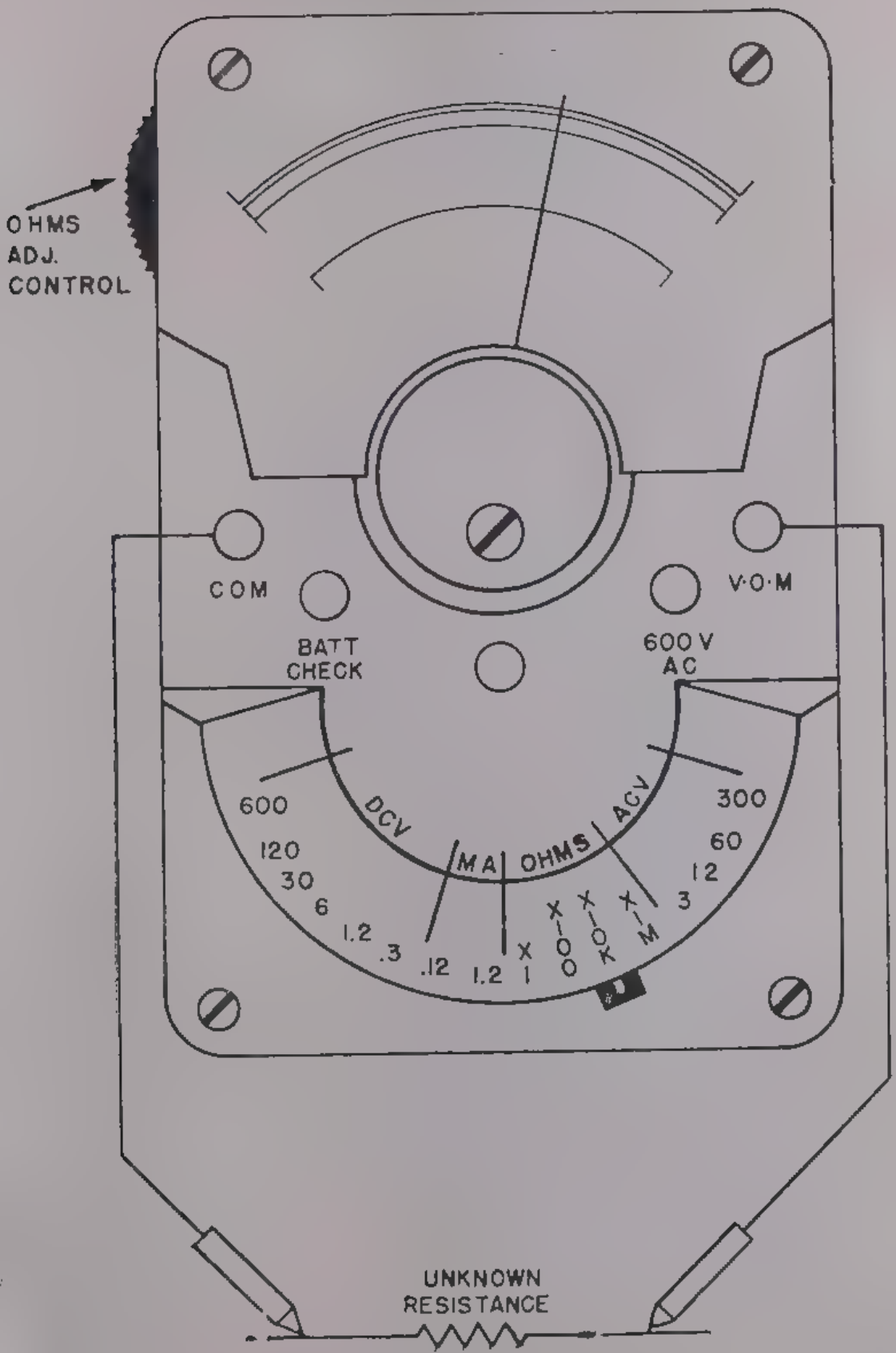
To make resistance measurements connect black test lead to "COM" jack and red test lead to "V-O-M" jack.

Place the range switch lever in the position you intend to use XI, X100, X10K or X1 Meg. Short the test leads together and adjust the ZERO ADJ. control so the pointer rests on "0". Open the test leads and adjust the OHMS ADJ. control to Full Scale or ∞.

The polarity of potential applied to the device under test can be reversed by operating the reversing switch located on the left side of the tester.

In the up position a positive voltage is applied to the red test lead. In the down position a negative voltage is applied to the red test lead.

Do not touch any metal parts of the circuit when using the high ohm ranges. It is not dangerous but your body resistance can cause serious error in reading.


OHMS
ADJ.
CONTROL
COM
BATT
CHECK
V·O·M
600 V
AC
600
120
30
6
1.2
.3
DCV
.12
MA
1.2
OHMS
X
1
X
100
X
10K
X
1M
ACV
3
12
60
300
UNKNOWN
RESISTANCE

DC Current Measurements

Two current ranges are available. These are: 0-120 Microamperes and 0-1.2 MA. Both ranges are read on the 12 Volt scale.

Place range switch lever in range position you intend to use.

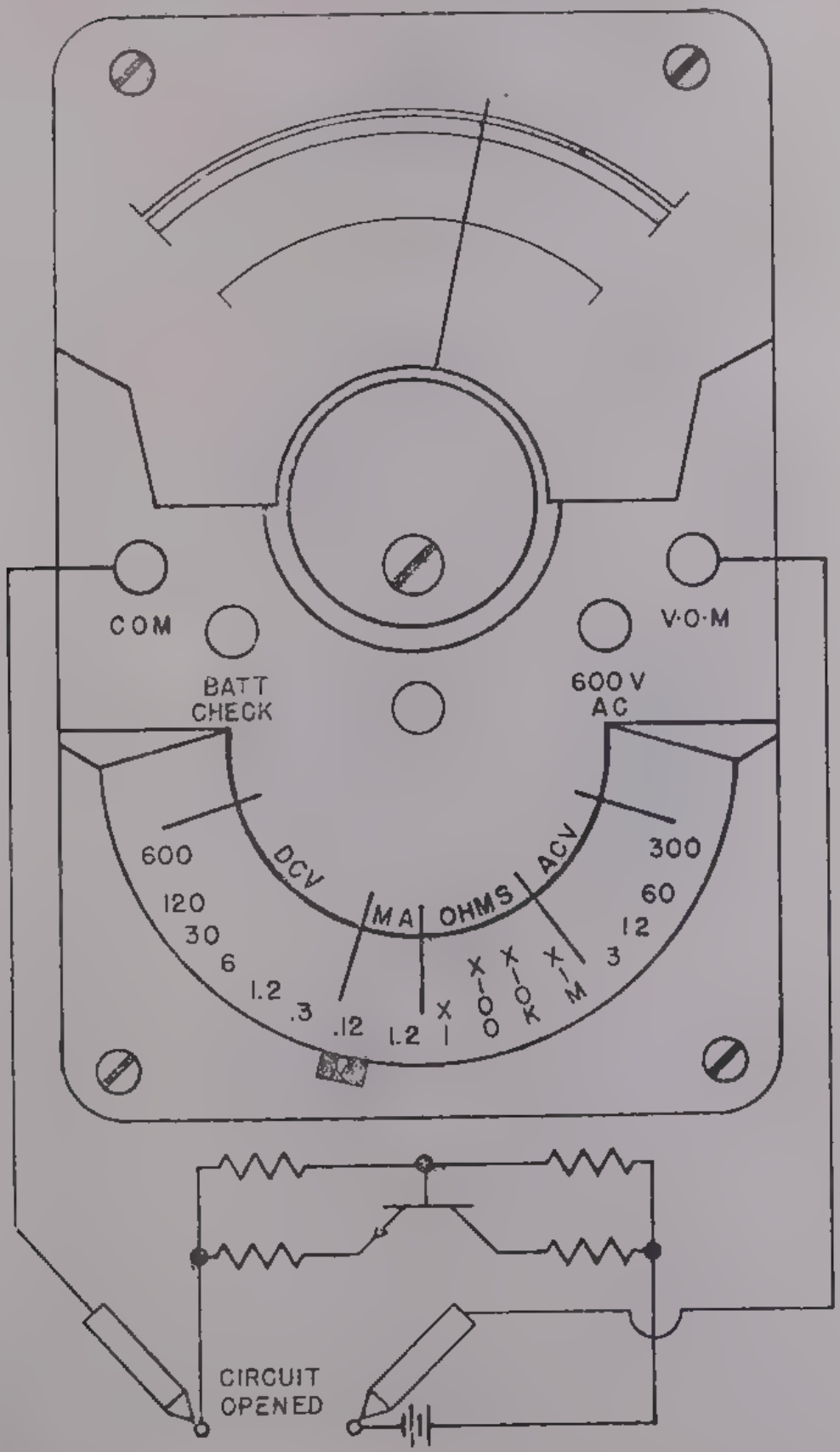
All current measurements are made with the test leads in the same jacks. The black lead in the jack marked "COM" and the red lead in the jack marked "V-O-M."

Before connecting test leads to circuit under test, be sure to check zero of the indicator. If it requires adjustment, adjust the ZERO ADJ. control as required.

The 310-FET can also be used as a center scale galvanometer when making current measurements. This is accomplished by adjusting the ZERO ADJ. control for a mid scale indication before connection to measurement circuit.

Place range switch lever in range position you intend to use.

Connect the test probe in series with the circuit to be measured. Do not test directly across any potential circuit as this may burn out the shunt. The red lead is positive. Where polarity is difficult to determine, the meter may read backwards. No damage will be done if this occurs. Simply operate the reversing switch.


COM
BATT CHECK
V·O·M
600 V AC
600
120
30
6
1.2
.3
DCV
.12
MA
1.2
OHMS
X 1
X 100
X 10K
X 1M
ACV
300
60
12
3
CIRCUIT OPENED

To Measure	Set Range Switch	Leads Con Black Lead Red Lead
DC Volts		
0-.3	DCV .3	V-
0-1.2	DCV 1.2	V-
0-6	DCV 6	V-
0-30	DCV 30	V-
0-120	DCV 120	V-
0-600	DCV 600	V-
AC Volts		
0-3	ACV 3	V-
0-12	ACV 12	V-
0-60	ACV 60	V-
0-300	ACV 300	V-
0-600	ACV 300	600
OHMS		
0-5K	X1	V
0-500K	X100	V-
0-50 Meg.	X10K	V
0-5000 Meg.	X1 Meg.	V
DC Mil.		
.12	MA .12	V
1.2	MA 1.2	V

ns OM" Below	Read on Scale	Each Scale Div. Equals
	300÷1000	.005 Volts
	12 ÷10	.02 Volts
	60 ÷10	.1 Volts
	300÷10	.5 Volts
	12x10	2 Volts
	60x10	10 Volts
	3 V AC	.05 Volts
	12	.2 Volts
	60	1 Volts
	300	5 Volts
	60x10	10 Volts
	0-5K	
	0-5Kx100	
	0-5Kx10K	
	0-5Kx1 Meg.	
	12÷100K	2 Mic.
	12÷10K	20 Mic.

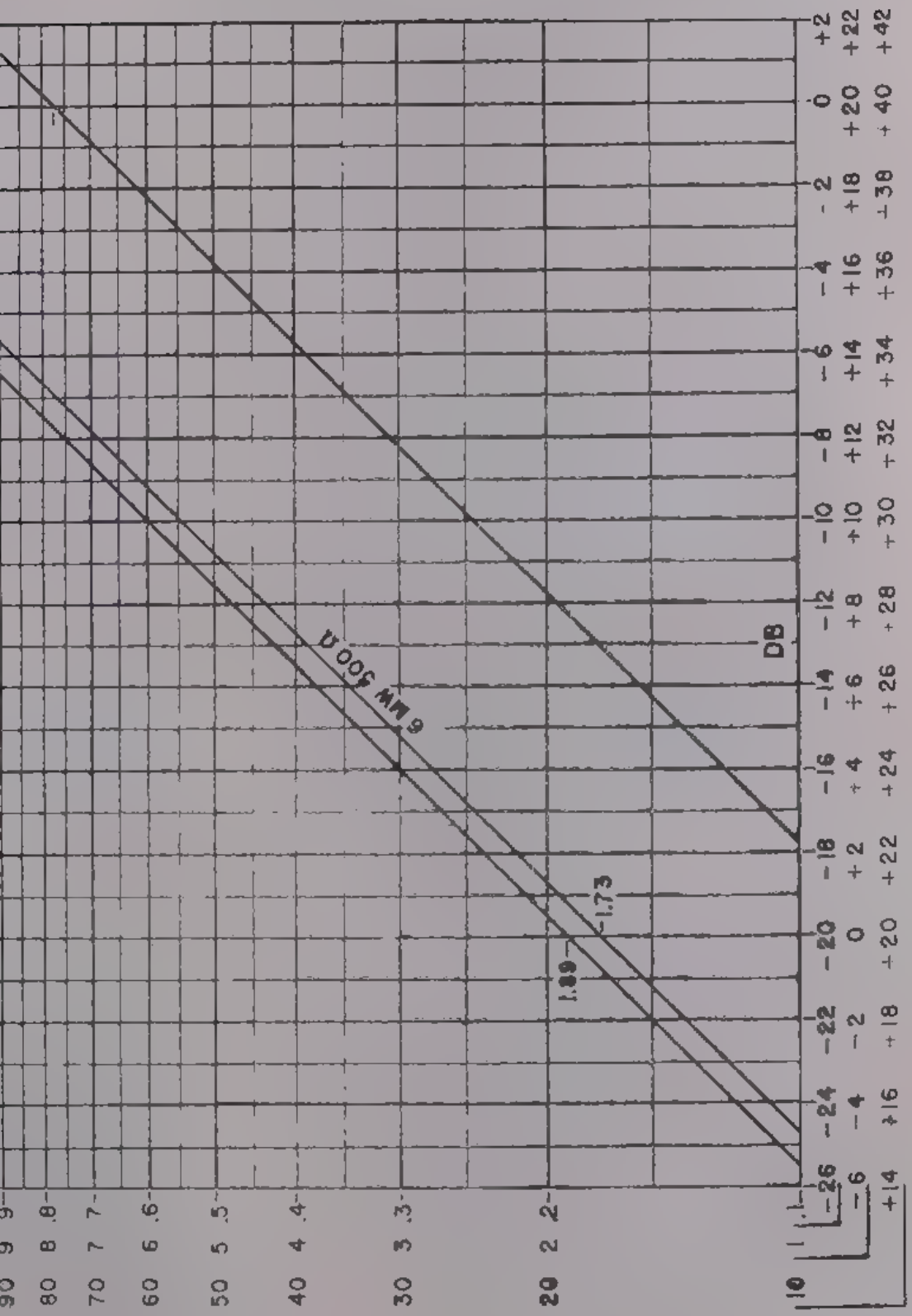
DB Measurements

The decibel is a unit that expresses the ratio of power levels. It is mathematically derived to reduce multiplication and division to addition and subtraction, respectively. The decibel measure, roughly approximates human hearing ratios. For this reason, it is commonly used in audio and telephone measurements.

Because the decibel represents a ratio, it may be used as a measure of absolute magnitude only when referred to a reference level.

To measure decibels set the tester for AC volts. Convert the readings to decibels with the aid of the chart on page 19.

Measuring Output Volts (DB)



Mechanical Zero Adjust

Turn tester off and with a small screw driver placed in the front window adjustment screw, adjust for zero.

Battery Check and Replacement

The tester utilizes two batteries. A 7 volt battery to power the FET bridge circuit and a 1½ volt battery for the Ohms circuit.

The 7 volt battery is checked by: placing the range selector to the battery check position (3 V AC) polarity reversing slide switch in UP (+) position and touching the red test lead probe from the VOM jack to the BATT. TEST button located on the left center of the tester. The pointer on the scale should fall in the BATT. OK block, if below replace 7 volt battery.

The ohms battery condition is determined when setting up for a resistance measurement. If when adjusting the OHMS ADJ. CONTROL full scale of the pointer cannot be reached, the Ohms battery should be replaced.

Battery Types Required

Battery B1 — 1½ volts
ASA Type N

	Mallory Duracell MN 9100	Alkaline
Medium	Eveready E90	Alkaline
Life	Burgess AL - N	Alkaline
	RCA VS 1075	Alkaline
	Mallory RM401 or RM401R	Mercury
Long Life	Eveready E401 or E401R	Mercury
NEDA-1102	Burgess HG401 or HG401R	Mercury

Battery	B2	7 volts	NEDA 1501
	Eveready	E175 —	Mercury
	Mallory	TR 175 —	Mercury
		or equivalent	

To replace either battery remove the small panel on back of the tester. Watch polarity when replacing batteries.

Cleaning Plastic Window

The plastic window has been treated at the factory to dissipate static charges. If cleaning is necessary, use cotton dipped in a solution of common household detergent and water. After cleaning, allow the solution to dry without rubbing; the resultant detergent film will effectively dissipate static charges.

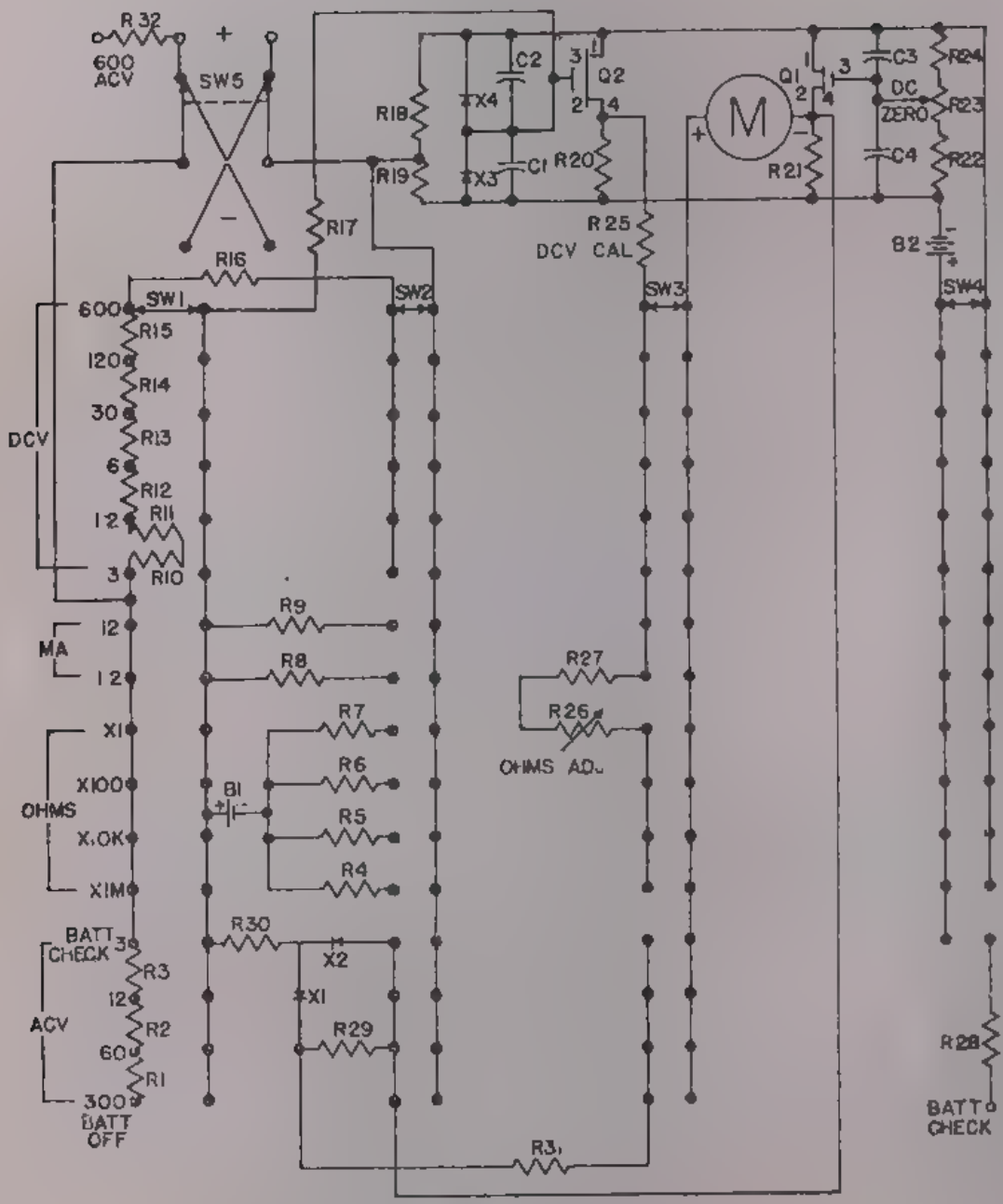
CAUTION: Solvents and liquids used in radio and TV shop work may craze or scar the plastic window if applied to it.

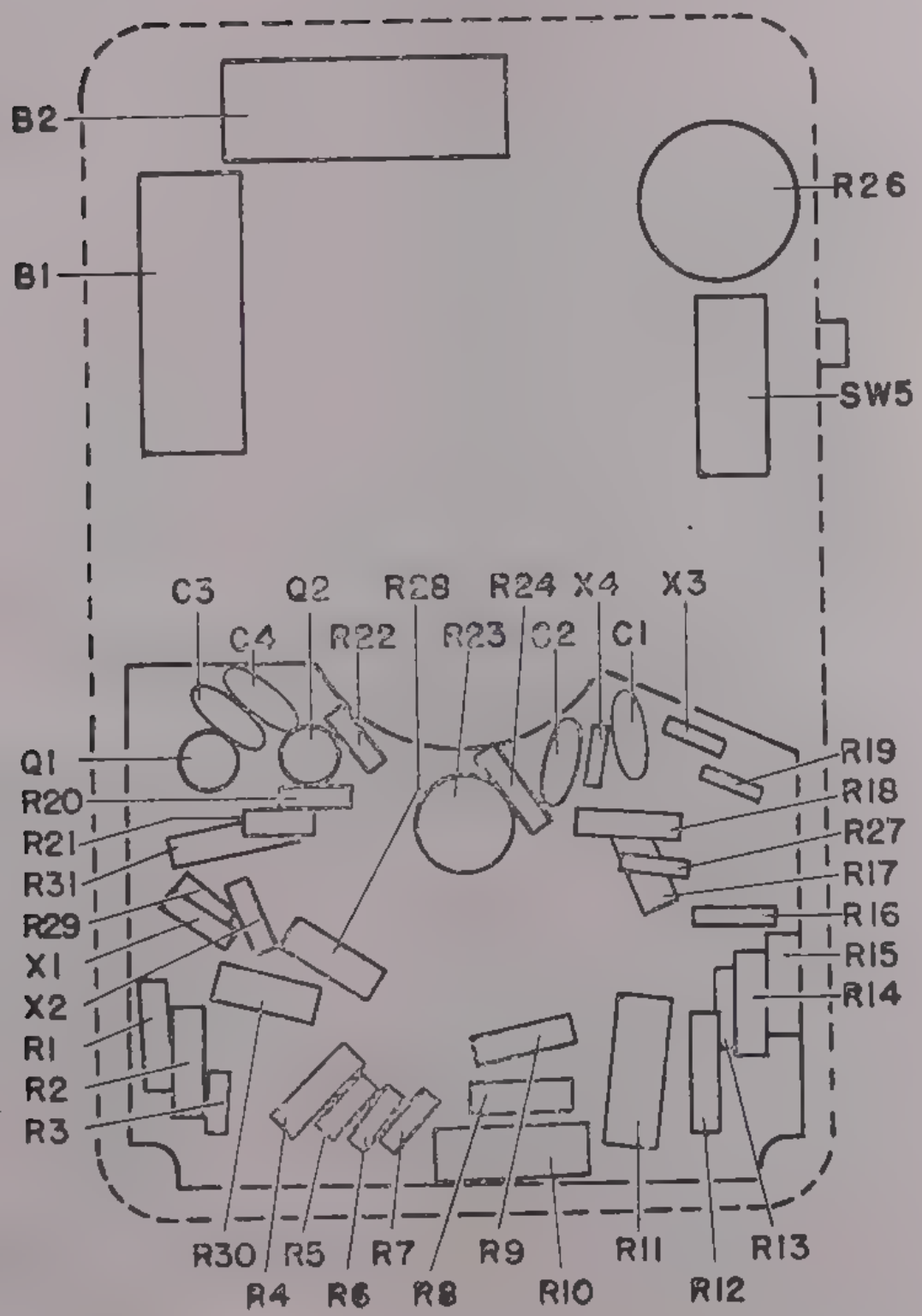
If the VOM has not been used for a long period of time, rotate the selector switch in both directions several times to wipe the switch contacts for good contact.

REPAIR OR SERVICE

In the event repair or service is required, please outline the nature of the difficulty. By providing this information, Triplett can supply more efficient service.

CIRCUIT DIAGRAM




B2
B1
R26
SW5
C3
Q2
R28
R24
X4
X3
C4
R22
R23
C2
C1
Q1
R20
R21
R31
R29
X1
X2
R1
R2
R3
R19
R18
R27
R17
R16
R15
R14
R30
R5
R7
R9
R11
R13
R4
R6
R8
R10
R12

REPLACEABLE PARTS MODEL 310 FET

Ckt. Sym.	Part No.	Req.	Description
	52-4059	1	Instrument Assembly, Susp. Type (50 uA 110 mV)
	10-2407	1	Front Assembly
	24-326	2	Screw, Front to Base, Upper
	30-41	2	Insert, Front to Base, Upper
	24-327	2	Screw, Front to Base, Lower
	5512	2	Insert, Front to Base, Lower
	33-30	3	Jack
	33-51	1	Jack, Battery Check
	32-175	4	Terminal, Jack
	147-34	4	Lockwasher, Jack
	27-89	4	Nut, Jack
	14-219	4	Washer, Jack
	34-103	1	Knob, Electrical Zero Adjust
	41-5348	1	Base Assembly
	33-34	1	Jack, Top Left of Base
	10877	1	Battery Plate Cover
	24-526	4	Screw, Battery Plate Cover
	46-32	1	Contact, Battery 1 5 V Positive

	46-130-1	1	Contact, Battery 7 V Negative
	46-130-2	1	Contact, Battery 7 V Positive
	46-110	1	Contact, Battery 1.5 V Negative
	2434-2-3	2	Screw, Battery Contact Retaining
	24-727	1	Screw, Battery Contact (46-110) Retaining
	14-239	1	Washer, Flat (Under 46-130-2 Contact)
	12092	1	Switch Lever Assembly
	39-105	1	Bushing (Short) Switch Lever Assembly
B1	37-29	1	Battery, 1.5 Volt
B2	37-37	1	Battery, 7 Volt
	87-174	1	P. C. Board With Components
	87-168	1	P. C. Board Less Components
R1	15K1204TB4	1	Resistor, 1.2 MegΩ, 1%, ¼ Watt
R2	15K-2403TB4	1	Resistor, 240 KΩ, 1%, ¼ Watt
R3	15K-4502TA3	1	Resistor, 45 KΩ, 1%, ⅛ Watt
R4	15R-516JC	1	Resistor, 51 MegΩ, 5%, ½ Watt
R5	15R-514JB	1	Resistor, 510 KΩ, 5%, ¼ Watt
R6	15R-512JB	1	Resistor, 5.1 KΩ, 5%, ¼ Watt
R7	15R-510JB	1	Resistor, 51Ω, 5%, ¼ Watt
R8	15K-2500TA3	1	Resistor, 250Ω, 1%, ⅛ Watt
R9	15K-2501TA3	1	Resistor, 2.5 KΩ, 1%, ⅛ Watt

REPLACEABLE PARTS MODEL 310 FET

Ckt. Sym.	Part No.	Req.	Description
R10 & 11	15-5238	2	Resistor, 3.75 MegΩ
R12	15K-2004TB4	1	Resistor, 2 MegΩ, 1%, 1/4 Watt
R13	15K-4003TB4	1	Resistor, 400 KΩ, 1%, 1/4 Watt
R14	15K-7502TA3	1	Resistor, 75 KΩ, 1%, 1/8 Watt
R15	15K-2002TA2	1	Resistor, 20 KΩ, 1%, 1/8 Watt
R16	15K-5001TA3	1	Resistor, 5 KΩ, 1%, 1/8 Watt
R17	15R-105JB	1	Resistor, 1 MegΩ, 5%, 1/4 Watt
R18	15K-7682TA3	1	Resistor, 76.8 KΩ, 1%, 1/8 Watt
R19*		1	Resistor, (Value may vary from 16 K to 43 K)
R20 & 21	15R-133JB	2	Resistor, 13 KΩ, 5%, 1/4 Watt
R22*		1	Resistor, (Value may vary from 13 K to 43 K)
R23	16-200	1	Resistor, Variable 15 K
R24	15K-9312TA3	1	Resistor, 93.1 KΩ, 1%, 1/8 Watt
R25*		1	Resistor, (Value may vary from 1470 Ω to 2740 Ω)
R26	16-201	1	Resistor, Variable 10 KΩ
	65-540-1	1	Bracket, R26 Retaining
	5168	3	Lockwasher, R26 Retaining

	27-83	2	Nut, R26 to Bracket
	2434-2-3	1	Screw, R26 Bracket Retaining
R27	15R-183JB	1	Resistor, 18 KΩ, 5%, ¼ Watt
R28	15K-5702TA3	1	Resistor, 57 KΩ, 1%, ⅛ Watt
R29*		1	Resistor, (Value may vary from 6.5 K to 6.6 K)
R30*		1	Resistor, (Value may vary from 11.2 K to 11.3 K)
R31	15K-2801TB4	1	Resistor, 2.8 KΩ, 1%, ¼ Watt
R32	15K-1504TB4	1	Resistor, 1.5 MegΩ, 1%, ¼ Watt
C1, 2, & 3	43-325	3	Capacitor, .01MF 25 V
C4	43-324	1	Capacitor, .0068MF 100 V
X1 & X2	11056	2	Diode
X3 & 4	10991	2	Diode, CD1117
SW5	22-425	1	Switch, Slide
Q1 & Q2	2250-67		Service Kit: Matched Set Q1, Q2, R19, R22 & R25, for Service Use
	79-153	1	Test Leads, Needle Point
	79-296	1	Test Leads, Blunt Point
	2567-56	1	Tip, Double End, Ground Lead

* Specify value when ordering.

NOTES

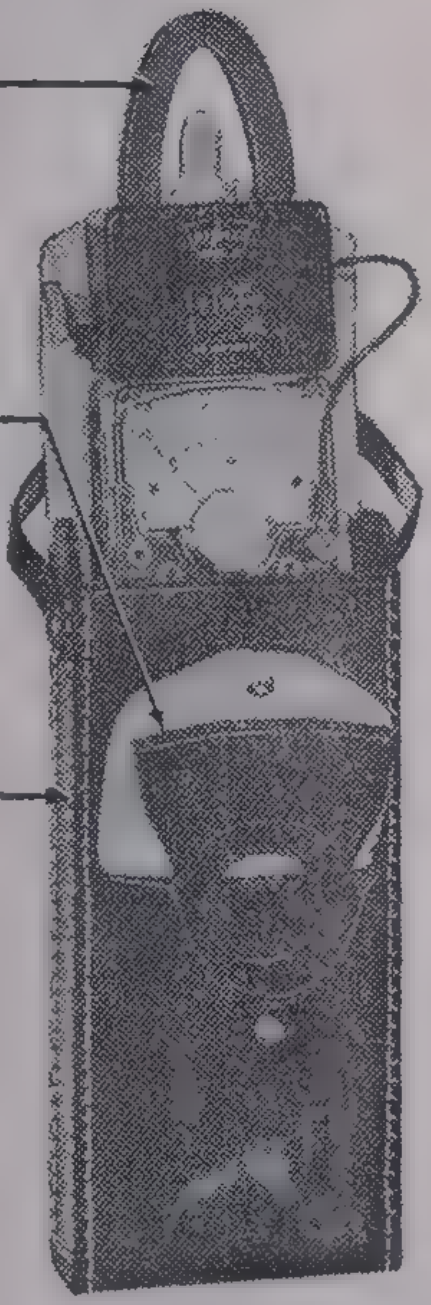
ACCESSORIES FOR 310-FET

Model 10 Clamp-on AC Ammeter — Cat. No. 60-211
Ranges, 0-6-12-30--60-120-300

Model 101 Line Separator — Cat. No. 60-218— Divides two conductor cords direct or increases Model 10 sensitivity 10x and 20x.

Model 379 Carrying Case — Cat. No. 10-1456 For Model 310-FET and Model 10 combination, plus Model 101.

Model 311 Lead — Cat. No. 79-161 42" long lead to separate Model 10 from 310-FET unit for easy reading in awkward spots. (not shown)



Model 369 Carrying Case — Cat. No. 10-1258.

LIMITED WARRANTY

The Triplett Corporation warrants instruments and test equipment manufactured by it to be free from defective material or factory workmanship and agrees to repair or replace such products which, under normal use and service, disclose the defect to be the fault of our manufacturing, with no charge for parts and service. If we are unable to repair or replace the product, we will make a refund of the purchase price. Consult the Instruction Manual for instructions regarding the proper use and servicing of instruments and test equipment. Our obligation under this warranty is limited to repairing, replacing or making refund on any instrument or test equipment which proves to be defective within one year from the date of original purchase.

This warranty does not apply to any of our products which have been repaired or altered by unauthorized persons in any way so as, in our sole judgment, to injure their stability or reliability, or which have been subject to misuse, abuse, misapplication, negligence or accident or which have had the serial numbers altered, defaced, or removed. Accessories, including batteries, not of our manufacture used with this product are not covered by this warranty.

To register a claim under the provisions of this warranty, return the instrument or test equipment to Triplett Corporation, Bluffton, Ohio 45817, transportation prepaid. Upon our inspection of the product, we will advise you as to the disposition of your claim

ALL WARRANTIES IMPLIED BY LAW ARE REBY LIMITED TO A PERIOD OF ONE AR, AND THE PROVISIONS OF THE ARRANTY ARE EXPRESSLY IN LIEU OF Y OTHER WARRANTIES EXPRESSED OR PLIED.

The purchaser agrees to assume all li- ility for any damages and bodily injury ich may result from the use or misuse of product by the purchaser, his employees, others, and the remedies provided for in s warranty are expressly in lieu of any er liability Triplett Corporation may have, luding incidental or consequential dam- es.

Some states do not allow the exclusion or itation of incidental or consequential mages, so the above limitation or exclu- n may not apply to you. No representa- e of Triplett Corporation or any other son is authorized to extend the liability Triplett Corporation in connection with sale of its products beyond the terms eof.

Triplett Corporation reserves the right to continue models at any time, or change ecifications, price or design, without no- e and without incurring any obligation.

This warranty gives you specific legal hts, and you may have other rights which y from state to state.

Triplett Corporation

Bluffton, Ohio 45817

ted in U. S. A. **84-185G**

NOTES

MP MASTER

MA26095

MP MASTER

MA26095

Triplett Corporation Bluffton, Ohio 45817